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The Wage Effects of Fixed-term Contract Employment Revisited: an Investigation Based on Social Security Records

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Abstract

Using data from social security records on Spanish males, we investigate the wage effects of working under a fixed-term contract. In a first step, we provide fixed-effects estimates of the wage effect of working under a fixed-term contract for low-skilled, medium-skilled, and high-skilled men based on administrative data. Next, we include the individual's work history into the wage equation to obtain wage effects conditional on the work history and to study the returns to experience under fixed-term contracts. For this analysis we employ a three-equation random effects model estimated by Markov Chain Monte Carlo (MCMC) methods. Finally, we use the estimates of this model to simulate the long-term effects of working under a fixed-term contract on future career outcomes. Our results suggest that controlling for observable characteristics and unobserved heterogeneity, there remains basically no wage effect of working under a fixed-term contract for the low-skilled and the medium-skilled but a considerable negative wage effect for the high-skilled. The returns to experience under a fixed-term contract are on average similar to the returns to experience under a permanent contract, but effect heterogeneity exists. Working under a fixed-term contract for one year leads to an increased probability to work under a fixed-term contract in the next years, a strongly increased risk of unemployment, and to a reduction in earnings.

Key words: Fixed-term and permanent contracts, wage differentials, random effects models, MCMC.

JEL classification: J31, J24, C33, C11

I. Introduction

Since the mid-1980s, many Continental European countries have maintained strong employment protection for regular jobs while at the same time creating more flexible labor market segments. These countries have experienced a deepening segmentation of their labor markets with some workers holding permanent and highly protected jobs, on the one side, and other workers experiencing high turnover across precarious and fixed-term contracts jobs on the other (Bentolila et al., 2012; Boeri, 2011; Blanchard and Landier, 2002; Dolado, et al., 2002; Eichhorst, 2007; among others). Fixed-term workers are faced with strong disadvantages with regard to job security and often also with regard to job related benefits. Also wages are much lower in fixed-term contract jobs than in permanent jobs, at least unconditional on the employee's characteristics and work history.

In this paper, taking a microeconomic perspective, we use longitudinal data from social security records on prime age Spanish men to revisit the following questions: Is the observed contract wage differential due to fixed-term contract work being less paid or is it due to observed and unobserved workers' characteristics and their work histories? How is experience under fixed-term contracts rewarded for those who stay under a fixed-term contract and for those who finally switch to a permanent contract? What are the long-run career effects of working under a fixed-term contract? And, finally, how does the increased risk of becoming unemployed which fixed-term workers face translate to earnings? Spain provides a particularly interesting case to study the effects of employment under fixed-term contracts as the labor market is characterized by very strong employment protection for workers under permanent contracts on the one hand and general applicability of fixed-term contracts (e.g. not restricted to particular sectors) on the other hand.

Fixed-term contract jobs are mainly used for three reasons: for seasonal or casual work, to be able to flexibly adapt labor input to changing economic circumstances, and as a screening device (e.g. Booth, 2002; Güell and Petronoglo, 2005). Fixed-term contract workers

may be less productive than permanent workers, because of the tasks they are performing or because they are less able or less experienced than permanent workers. One reason is that seasonal or casual jobs (often held by low-skilled individuals) are likely to involve relatively few highly productive tasks. Also those workers representing the flexible labor input in a firm may perform less highly productive tasks than the permanent staff. This argument may be relevant for all skill groups, but in particular for jobs typically performed by the medium-skilled. Moreover, as permanent contracts are *ceteris paribus* more attractive than fixed-term contracts, sorting based on ability and skills will occur. For those fixed-term contracts used as a screening device (e.g. Blanchard and Landier, 2002; Kahn, 2013), sorting into fixed-term contracts based on ability is not necessarily negative during the screening periods, but the fixed-term contract workers have low job-specific human capital. If the before mentioned arguments are empirically important, a raw contract wage differential is to be expected and it will decrease when observed and unobserved heterogeneity are controlled for - in particular if the arguments related to ability and experience are important and in particular for the low-skilled and the medium-skilled (in casual jobs and serving as flexible labor input). A different argument to explain contract wage differentials is that fixed-term workers may be compensated for their disadvantages (e.g. Booth et al., 2002). This may be especially relevant for those workers serving as flexible labor input. If this occurs, the conditional wage effects might even be positive.

Fixed-term workers staying under a fixed-term contract for a longer period of time may experience weaker or stronger wage growth than permanent workers (Amuedo-Dorantes and Serrano-Padial, 2007). Wage growth may be weaker if there is less training under fixed-term contracts and promotions are not possible. It may be stronger if fixed-term contract workers show much effort as an attempt to have their contract renewed or if compensating wages differences exist for long-term fixed-term contract workers. In case fixed-term contracts are used as a screening device for jobs at which ability is important and difficult to

be observed and if the contract is only converted to a permanent one if the match is very good, these previous fixed-term contract workers are likely to move up in the wage ladder of the firm in the following years and thus starting with a fixed-term contract may end up to in a particularly successful career. This argument is supposed to be relevant mainly for university graduates.

The wage effects of working under a fixed-term contract and the wage returns to experience under fixed-term contracts have been studied in a number of papers (e.g. Booth et al., 2002; Davia and Hernanz, 2004; De la Rica, 2004; Jimeno and Toharia, 1993; Kahn, 2013), but we are not aware of any paper based on administrative data¹. We think that using administrative data as the Spanish Continuous Sample of Working Histories (CSWH) makes a contribution to the research based on survey data, because of (1) the large size of administrative data which allows to do separate analysis by skill groups and to flexibly specify the work history in the wage equations, (2) the quarterly frequency of the panel we construct and, (3) very reliable information on wages and contract status.² Using panel data has been found to be crucial by those few studies that have employed panel data (e.g. Booth et al., 2002; Kahn, 2013). In the present paper, we construct a quarterly panel from the CSWH and proceed in three steps. In the first step of our analysis, we use OLS and fixed-effects (FE) wage regressions specified in a similar way as in the literature. This adds to the previous literature as the estimation is done separately by skill groups and as administrative data is used. In a second step, we introduce a detailed work history - in particular with regard to previous experience under fixed-term contracts and past unemployment - into the wage equation. This allows us to study the wage effect of fixed-term contract work given the work history as well as the returns to experience under fixed-term contracts. We discuss the returns

¹ Fernandez-Kranz et al. (2011) use the same data source as the present paper and touch on the wage effect of full-time fixed-term contract work for women, when investigating the wage effects of different flexible work arrangements which are common for women in Spain with a focus on part-time work

² A crucial advantage of the CSWH is that it includes information on contractual hours worked which is necessary to calculate hourly wages. This is a piece of information that is not always available in administrative data (e.g. in German data).

to experience of fixed-term contract work for those who are still working under a fixed-term contract and for who have switched to a permanent contract, contributing to the few papers which have investigated the returns to fixed-term contract work or the long-run effects of working under a fixed-term contract (Booth et al., 2002; Amuedo-Dorantes and Serrano-Padial, 2007). For this step of our analysis we depart from the FE model and use a three equation random-effects (RE) model. Even though this is a RE model, it allows for the current and past employment status and contract status to be correlated with unobserved heterogeneity. We estimate the three equations simultaneously using by Markov Chain Monte Carlo (MCMC) methods. Using a RE model improves the estimation of the parameters relating to the work history. Moreover, as in this model the employment status and the contract status are modeled along with the wage and as from the MCMC estimation we receive information on all parameters including the random effects, we obtain all information which we need for the third step of our analysis. In the third step, we simulate the long-run effect of fixed-term contract work for one year as opposed to permanent contract work for one year on the employment probability, the contract status, and wages. This allows us to investigate long-term career effects of fixed-term work. We also calculate the earnings effect of fixed-term contract work which takes into account the strongly increased risk of unemployment a fixed-term contract worker faces.

The findings of this paper confirm that there is a huge raw wage differential between fixed-term contract jobs and permanent-contract jobs. The results of the FE approach suggest that controlling for observable characteristics and unobserved heterogeneity, there remains basically no wage effect of working under a fixed-term contract for the low-skilled and the medium-skilled but a considerable negative wage effect exists for the high-skilled. The returns to experience under a fixed-term contract are on average similar to the returns of experience under a permanent contract, but effect heterogeneity exists. Experience under fixed-term contract tends to be a little less rewarded than experience under permanent

contracts for the low-skilled. But high-skilled workers strongly benefit from experience under fixed-term contracts in particular if they have switched to a permanent contract. Results of the simulation suggest that working under a fixed-term contract for one year, as opposed to working under a permanent contract for this year, leads to a much higher probability of fixed-term contract work and of unemployment in the following years. The effects on hourly wages conditional on working tend to be positive and small (with some exceptions), but there are large, negative, long-lasting effects on earnings (i.e. wages set to zero if not working). This finding mirrors the fact that fixed-term contract workers face a much higher risk to switch to unemployment than permanent contract workers and thus suffer from a strong loss in income through this channel.

The remainder of the paper is organized as follows. Section 2 provides a short literature review, Section 3 presents the institutional context and the data, Section 4 discusses the econometric specification and estimation. The results are presented in Section 5 and Section 6 concludes.

II. Related Literature

We shortly review previous literature on the wage effect of employment under fixed-term contracts using panel data.³ Booth, Francesconi, and Frank (2002, henceforth BFF) are one of the first to investigate employment under fixed-term contracts based on panel data. Using survey data for Britain, they provide a comprehensive picture of temporary work in Britain in the 1990th. Apart from investigating several other questions, they estimate the wage gap between permanent and temporary work (distinguishing seasonal-casual jobs and fixed-

³ Fixed-term contract work should be distinguished from temporary agency workers and similar types of workers on which the earlier US literature focusses (Housman, 1997; Segal and Sullivan, 1998; and Lane et al., 2002). There is also a European literature on temporary agency workers (see for instance Jahn and Pozzoli, 2013).

term contracts) using Mincer wage regressions. They run OLS and FE estimations controlling for a large number of individual and job-specific characteristics. For men they find a raw wage gap of 16% between permanent contract work and fixed-term contract work. OLS regression give about the same results (17%) and using a FE model the gap reduces to 7%. In a separate analysis BFF use a Hausman-Taylor type of approach (Hausman and Taylor, 1981) to estimate the effect of temporary work in the past on current wages. They account for time-invariant individual and job specific heterogeneity and for endogeneity of experience, tenure and contract type by instrumenting them with the deviations from within-job means of time-varying variables and the within job means of all exogenous variables. With regard to holding one fixed-term contract in the past, BFF find a significant negative wage effect of 4.6%. Depicting different wage-experience profiles, their results suggest that those who had one or several fixed-term contracts in the beginning of their career, earn lower wages than those always working under a permanent contract. But they enjoy a higher wage growth once they hold a permanent contract, so that the wage differential decreases over time.

One important finding of BFF is that time-invariant unobserved individual heterogeneity is important and thus panel data is required to investigate the question if work under fixed-term contract is less paid than under permanent contracts. Up to now, only few further studies have used longitudinal data. For example, Kahn (2013) investigates the wage differential between fixed-term contract and permanent contract workers in the second half of the 1990th using survey data (the ECHP) on thirteen European countries including Spain. For Spain he finds a raw wage differential of 46 log points. Using an FE model the wage effect of working under a fixed-term contract strongly reduces to 4.3 log points. Among other questions, Kahn in particular investigates the hypothesis that the wage gap declines with increasing experience. Supporting this hypothesis, he finds that the wage gap is lower for older workers. Also Kahn stresses the role of time-invariant unobserved heterogeneity with

regard to selection into fixed-term contracts, as his OLS results suggest much larger wage gaps than his FE results.

Amuedo-Dorantes and Serrano-Padial (2007) also using ECHP data (for 1995-2001), but focusing on Spain only, examine wage growth patterns by type of contract and by job mobility. They use a switching regression model and account for time-invariant unobserved heterogeneity. They find that wage growth among workers with permanent contracts primarily occurs via job mobility. In contrast, fixed-term employees experience wage gains via job mobility as well as on-the-job. As a result, among job stayers, fixed-term workers are able to narrow their wage gap with respect to similar counterparts with permanent contracts due to experiencing a 4 percentage points higher yearly wage growth. However, given the limited number of fixed-term contract workers who manage to keep their jobs beyond their initial contractual agreement, on average wage gap between past fixed-term and indefinite-term workers remains. Finally, Fernandez-Kranz et al. (2011) investigate the wage effects of different flexible work arrangements for *women* in Spain. They use data from the same source as the present paper. Their focus is on work arrangements involving part-time work, but their approach allows them to also compare wages across contracts. Using a similar approach as the present paper, they find that, once observed characteristics, time-invariant unobserved heterogeneity, and the women's work history is taken into account, there is hardly any effect of working full-time under a fixed-term contract as opposed to working full-time under a permanent contract. The wage effect of working part-time under a fixed-term contract as opposed to full-time under a permanent contract is strongly negative and accumulates over time. In the present paper part-time work is not considered, as its incidence is rare for males in Spain.

III. Institutional Background and Data

Institutional Background

Prior to 1984, most contracts in Spain were permanent contracts. With such contracts, the costs of dismissing a worker were high (up to 45 days of wages per year worked if the worker appealed to Court and the dismissal was declared “unfair”, with a limit of 24 months’ wages). In 1984, in a context of high unemployment and given that an across-the-board reduction of dismissal costs was politically unfeasible; the use of fixed-term contracts was liberalized. This implied that any regular activity could be performed under a fixed-term contract (instead of a permanent one), but at a lower cost for employers as fixed-term contracts entailed lower severance payments than permanent contracts (8 days per year worker if the worker was laid-off prior to contract termination) and their termination could not be appealed to Court. Moreover, the regulation that established that fixed-term contracts could only be used up to a maximum of three consecutive years was not enforced until 2010.

As a consequence, the large majority of new contracts are fixed-term contracts. The conversion rate was less than 10% in the nineties (Güell and Petrongolo, 2007). Fixed-term contract employment is unstable. According to Amuedo-Dorantes and Serrano-Padial, 2007, turnover rates among fixed-term contract workers are high (in the range of 34 to 66 percent), and contrast with those of permanent contract workers (only 10 percent of permanent contract workers experience turnover). Moreover, while the vast majority of job movers with a fixed-term contract transition to a new fixed-term contract job or become unemployed, those with a permanent contract transition to a new permanent contract job or retire. Worker with permanent contracts enjoy more protection, and benefits. Fixed-term contract jobs are on average lower paid jobs than permanent jobs. This finding still holds if one conditions on important observable characteristics of the workers and the firms (Jimeno and Toharia, 1993; Bentolila and Dolado 1994; Davia and Hernanz, 2004; De la Rica, 2004).

Data and Descriptive

We use a panel data set in calendar quarters for the years 1996 to 2004 constructed from the Spanish Continuous Sample of Working Histories (CSWH). The CSWH is a non-stratified random sample of the population registered with the Social Security Administration. We employ a random sample of Spanish men of age 23 to 50 who are not self-employed from the CSWH. The data starts in 1967 but before 1996 part of the information is not reliable. Therefore we construct a panel data set starting in 1996, but we additionally use information on experience, contracts, and tenure since 1993 when modelling the individual's labor market histories. To be able to do this, we restrict our sample to those individuals for whom this information is complete since 1993 or since they are first observed in the data, respectively. As no information on subsidies to promote work under permanent contracts – which we exploit to construct exclusion restrictions - is available after 2004, our analysis focuses on the years 1996 to 2004.⁴ A strong advantage of the CSWH is that there is no non-random panel attrition: each man in our sample is observed until the end of 2004 or until he turns 51, whatever occurs earlier.

The CSWH provides information on: (1) socio-demographic characteristics of the worker (such as sex, education, nationality, province of residence, and children in the household); and (2) worker's job information (such as type of contract, sector, firm, and monthly earnings). Although not reported in the CSWH, other variables such as experience and tenure can be calculated. Our measure of pay is hourly earnings, calculated as annual earnings excluding overtime divided by total contractual hours, deflated by the 2006 price deflator.

⁴ This leads to the following cases on how an inflow into our sample occurs (1) the inflow occurs in the first quarter of 1996 (the individual has potentially been employed before and we are able to control for this pre-sample labor market history) (53% of inflows), (2) if the individual is younger than 23 years old in the first quarter of 1996, the inflow occurs once the individual turns 23 years old (also in this case we control for prior work experience if applicable) (19%), (3) if the individual is at least 23 years old in the first quarter of 1996 but is not yet in the labor force, he enters the sample once contact with the administration starts (24%). The sample we use is well suited to study the role of (and returns to) labor market histories in wage regressions. To study the career of labor market entrants a different sample would have to be constructed.

Our sample selection results in an unbalanced panel of 805,144 observations on 37,861 men whom we observe on average for 29 quarters. 55% of the individuals are observed for all 36 quarters. Conditional on being employed (the employment rate is 92%), 14.43 percent of the observations relate to fixed-term contract work. Because we expect the wage effects of working under a fixed-term contract to be different by skill group, we run separate estimations by three skill groups based on educational degrees: low-skilled, medium-skilled, and high-skilled. According to this definition, in our sample 49% of men are low-skilled, 27% are medium-skilled and 24% are high-skilled. The employment rate is 93 percent for the low-skilled as well as for the medium-skilled and 90 percent for the high-skilled (see Panel A of Table 1). Conditional on being employed, 13 percent of the observations of the low-skilled (13 percent of the medium-skilled and 20 percent of high-skilled) relate to fixed-term contracts work (shown in the second row of Table 1). 23% of the men in the sample are never observed under a permanent contract (i.e. all spells relate to fixed-term contract work or unemployment) and 61% are never observed under a fixed-term contract (not shown in the Table). The rest switches at least once. Panel A of Table 1 also shows average (log) wages by contract type from which the raw contract wage differential can be calculated: it is highest for the medium-skilled (38 log points) and amounts to 35 log points for the high-skilled and 28 log points for the low-skilled.

Panel B of Table 1 highlights that men working under fixed-term contracts have on average very different labor market histories than those working under permanent contracts, not only with regard to past contract types but also with regard to past unemployment.⁵ Those who currently work under a fixed-term contract have on average collected much more quarters of experience under a fixed-term contract than those who currently work under

⁵ Note that we cannot distinguish between periods in unemployment and periods out of the labor force. As we focus on prime age males who have some relation with the social security administration, periods without employment will be periods in unemployment in most cases, but what we call unemployment may also be periods out of the labor force in some cases.

permanent contracts. Note, though, that the averages shown in the table hide the fact that there is a considerable share of permanent contract workers having many quarters of experience under a fixed-term contract: 24% of those men who have at some point switched to a permanent contract after having worked under a fixed-term contract have collected eight or more quarters of experience under fixed-term contracts and 10% of those men have collected even 12 or more quarters of experience under fixed-term contracts. The second row of Panel B shows that those working under a fixed-term contract have spent much more quarters in unemployment in the past than those working under a permanent contract. Also note that 88% percent of those men, who in the last period of the data work under a permanent contract, have never been unemployed in the time period we have in the sample, but this is the case only for 50% of those who are in fixed-term contract work in the last period of sample.

Panel C of Table 1 makes two points. First, it shows that switches from fixed-term contracts to permanent contracts are relatively frequent while switches from permanent contracts to fixed-term contracts hardly ever occur. The probability to work under a permanent contract in the following quarter for those who currently have a fixed-term contract is in between 5.2% for the low-skilled and 6.6% for the high-skilled. Switches from permanent contract work to fixed-term contract work hardly ever occur – the probability for such a switch is only 0.3%. Second, the last row of Table 1 highlights the important fact that fixed-term contract workers are much more likely to switch to unemployment than permanent contract workers, e.g. for medium-skilled workers holding a permanent contract the probability to switch to unemployment is 0.4% while it is 9.2% for fixed-term contract workers. This highlights the fact that the risk of unemployment is a major disadvantage of holding a fixed-term contract.

IV. The Econometric Specification and Estimation

Accounting for observed and time-invariant unobserved heterogeneity: a Fixed-Effects Model

In a first step, we investigate the wage effect of working under a fixed-term contract using a fixed-effects Mincer wage equation which we specify in a very similar way as in BFF and Kahn (2013). We model the wage equation as follows:

$$\ln W_{it} = \beta_0 + \beta_1 \text{FIX}_{it} + X'_{it} \beta_2 + \varphi_i + \varepsilon_{it}$$

where the left-hand side (LHS) variable is the natural logarithm of the deflated hourly wage of individual i in quarter t . FIX_{it} is a dummy indicating whether the worker currently works under a fixed-term contract. The vector X_{it} serves to control for individual characteristics, job characteristics, experience, tenure, regional effects, and time dummies depending on the particular specification (see results section for details). φ denotes an individual fixed-effect. An important advantage of the fixed-effects model is that time-invariant individual specific unobserved heterogeneity is allowed to be correlated with the right-hand side (RHS) variables. Such a correlation is likely to be important, in particular with regard to the contract dummy. A disadvantage of the fixed-effects model is that its identification comes only from switches, i.e. the approach is only based on time-series identification.

Accounting for prior fixed-term work and prior unemployment: a Three-Equations Random Effects Model

In a second step, we investigate the wage effect of working under a fixed-term contract conditional on the individual's work history, in particular conditional on previous fixed-term contract work and unemployment. This model provides a comparison of the wages of workers under different contracts having the same observed and time-invariant unobserved characteristics and the same work history. Moreover, using this model we study the wage

returns to fixed-term contract work in the past. And finally, we use this approach to simulate different employment scenarios. There are two reasons why we use a random effects approach here. First, we need the parameters of joint estimation of the employment status, the contract status, and the wage as well as information on the individual's time invariant heterogeneity term to implement the simulation. Second, to estimate the parameters of the work history is demanding and it may be helpful to use cross-sectional variation in addition to the time-series variation exploited by the FE estimator. Our model consists of three simultaneously estimated random effects equations. Methodologically, this approach is a somewhat restricted version of the model Buchinsky et. al. (2010) use to study the returns to seniority in the U.S. and it has also been used by Fernandez-Kranz et al. (2011). Below we describe each of the equations.

The wage equation. We model the wage equation as follows:

$$\ln W_{it} = \beta^W_0 + \beta^W_1 \text{FIX}_{it} + X^W_{it} \beta^W_2 + H^W_{it} \beta^W_3 + \alpha^W_i + \varepsilon^W_{it} \quad (1)$$

where again the LHS variable is the natural logarithm of the deflated hourly wage of individual i in quarter t , and the RHS variables include the dummy indicating whether the worker currently works under a fixed-term contract, FIX_{it} and a vector, X_{it} , which controls for an individual's characteristics (age and information if a child under the age of six is living in the household), firm characteristics (sector and a public sector dummy), regional characteristics (the provinces' unemployment rate, the provinces' GDP growth and dummies for each region), and year and quarter dummies. Furthermore, H^W_{it} , describes the individual's work history. When modeling the work history, we account for the following aspects: previous employment under a fixed-term contract, previous periods in unemployment, experience, tenure, and the number of previous jobs. Part of these aspects are accounted for in other studies and in our FE model above, but in particular the distinction if experience is

collected under a fixed-term contract or a permanent contract and previous unemployed are not accounted for in previous investigations. In the following, we describe the vector H_{it}^W capturing the work history in more detail: it consists of (1) an array of dummies capturing the number of past quarters under a fixed-term contract multiplied by the FIX_{it} dummy, (2) an array of dummies capturing the number of past quarters under a fixed-term contract multiplied by a $PERM_{it}$ dummy (i.e. a dummy if currently working under a permanent contract), (3) the number of past quarters in unemployment, and a dummy if at least one quarter was spent in unemployment. These variables are all endogenized with regard to time-invariant unobserved heterogeneity. Moreover, we add (1) tenure (the number of quarters of tenure in the current firm) and tenure squared multiplied by the FIX_{it} dummy, (2) tenure and tenure squared multiplied by the $PERM_{it}$ dummy, (3) the number of previous jobs multiplied by the FIX_{it} dummy, and (4) the number of previous jobs multiplied by the $PERM_{it}$ dummy. Tenure and the number of previous jobs are not endogenized in our model. Finally, the vector H_{it}^W includes an array of dummies of t to control for the time since inflow in the sample (this accounts for the elapsed duration of the work history observed in the sample) as well as quarters of experience in the three years before the start of the sample of analysis and the share of work experience before the start of the sample which was under a fixed-term contract. For each array of variables we include into H_{it}^W and each equation, we need to decide if we use separate dummies, dummies summarizing several values if using separate dummies is too demanding (e. g. five to eight quarters of experience under a fixed-term contract) or polynomials (e. g. tenure and tenure squared). We base these decisions on patterns observed during the specification search and sensitivity analysis. The final specification of the equations can be found in the Appendix Table A.1. Finally, α_i^W is an individual random effect capturing time-invariant unobserved heterogeneity.

The contract equation. The contract equation is a dynamic random effects probit model of a fixed-term contract dummy on a vector of observed characteristics, X_{it}^F , and the individual's work history vector, H_{it}^F and a vector of two exclusion restrictions Z_{it}^F .

$$(2) \quad \text{FIX}_{it} = I(\text{FIX}_{it}^* > 0)$$

$$\text{FIX}_{it}^* = \beta_0^F + X_{it}^{F'} \beta_1^F + Z_{it}^{F'} \beta_2^F + H_{it}^{F'} \beta_3^F + \alpha_i^F + \varepsilon_{it}^F$$

The individual's work history vector captures state dependence and duration dependence in fixed-term employment as well as information on periods in unemployment, the time since inflow into the sample, t , tenure, the number of previous jobs, experience before the start of the sample of analysis, and the share of work experience before the start of the sample which was under a fixed-term contract. Given that the contract equation is a dynamic equation, we thus need to deal with the initial condition problem. We apply a restricted version of the approach suggested by Wooldridge (2005) to deal with a potential correlation between the unobserved heterogeneity term and the initial value of the LHS variable by adding the initial value of the LHS variable to the work history vector in each period. For the details of the final specification of X_{it}^F and H_{it}^F the reader is referred to Appendix Table A.1. For the exclusion restrictions we exploit information on the amount of a subsidy available to offer permanent contracts (to new hires or for contract conversion) which differ by province, age, and year. This subsidy has first been used as an instrument by Barcelo and Villanueva (2010). Such a subsidy is available for about 44% of all spells in our data (it is available in almost all regions but not in every year) and it varies between 1,5 and 14 Thousand Euros of lump sum payment or tax subtraction for the employer. The two exclusions restrictions (vector Z_{it}^F) are the amount of the subsidy in Thousand Euros interacted with a dummy if the individual was working under a fixed-term contract in the previous quarter (to capture the effect on converting contracts) and a the amount of the subsidy interacted with a dummy if the individual was not employed in the previous quarter (to capture the effect on hiring under a permanent contract). The subsidy will have an effect on the probability of fixed-term contract

employment as it provides an incentive to hire an individual under a permanent contract or convert a fixed-term contract to a permanent contract. The subsidy is not supposed to have a direct effect on the individual's wage once region, age and year are controlled for. The exclusion restrictions render an additional source of identification in addition to that implied by the function form assumptions we enforce.

The employment equation. The employment equation is a dynamic random effects probit model of an employment dummy on a vector of observed characteristics, X_{it}^E , and the individual's work history vector, H_{it}^E and an exclusion restriction z_{it}^E .

$$(4) \quad E_{it} = I(E_{it}^* > 0)$$

$$E_{it}^* = \beta_0^E + X_{it}^{E'} \beta_1^E + \beta_2^E z_{it}^E + H_{it}^{E'} \beta_3^E + \alpha_i^E + \varepsilon_{it}^E$$

The vector of observed characteristics and the work history vector are modeled in the same way as in the contract equation. As an exclusion restriction we use the share of public sector employment in a region-year-occupation spell, assuming that this has no direct effect on the individual's wage.

Distributions of the error terms. α_i^W , α_i^F , α_i^E are assumed to follow a joint normal distribution $N(0, \Sigma)$ and may thus be correlated. This allows for selection based on time invariant unobserved heterogeneity. The idiosyncratic errors are assumed to be independently normal distributed: $\varepsilon_{it}^W \sim N(0, \sigma^2)$, $\varepsilon_{it}^F \sim N(0, 1)$, $\varepsilon_{it}^E \sim N(0, 1)$.

Estimation of the three equations model

We use Bayesian Markov Chain Monte Carlo (MCMC) techniques to estimate the model. This approach avoids simulating integrals and allows a numerically robust estimation of the flexible model specification. The goal of this technique is to obtain a sample from the

posterior distribution of the model parameters. The mean of the posterior distribution converges to the point estimator from maximum likelihood estimation, and the variance of the posterior distribution converges to the asymptotic variance of the point estimator in maximum likelihood estimation. Therefore, we can interpret the mean of the draws as the coefficient and the standard deviation as standard errors.⁶ We use very diffuse priors. For the coefficients, we use independent Gaussian priors and the prior for the variance matrix of the random effects is an inverted Wishart distribution. We obtain a sample of the posterior distribution of our model parameters by running 50,000 iterations of a Gibbs sampling algorithm. Convergence is monitored by comparing the means at different stages of the chains. The first 10,000 iterations are discarded (the burn-in phase). We implemented the Gibbs sampler in Stata

V. Results

Results of the fixed-effects model

In this section we discuss the results of the FE model which may be compared to the FE results in BFF and Kahn (2013). We also provide OLS estimates. We start by showing the raw wage differential between fixed-term and permanent-contract jobs (first row of Table 2). It lies between -28 log points for the low-skilled and -38 log points for the medium-skilled. This is a very large wage differential, but it is smaller than the one found by Kahn (2013) using the ECHP. He finds -46 log points as a raw wage differential and a 4% negative wage effect for Spain in his FE regression. A likely reason for a larger raw wage differential found by Kahn based on the ECHP is that his sample includes foreigners who are more likely to work under a fixed-term contract and who are also on average earning lower wages than natives. Furthermore, it may be the case that the ECHP includes jobs that are not registered as

⁶ See Chib (2008) for a survey of MCMC methods for Panel data and Train (2003) for an overview over important properties of MCMC estimators. Recent applications in labor economics are Buchinsky et al. (2010), Fitzenberger *et. al.* (2010), Horny *et al.* (2012), and Troske and Voicu (2010).

the employment status in the ECHP is based on an individual's own perception. In addition Kahn (2013) is based on earlier years.

Controlling for basic characteristics using Pooled OLS (POLS), the wage effect of working under a fixed-term contract is reduced to about one half (second row of Table 2). Additionally controlling for experience, it declines to -1.8% for the low-skilled, -6.6% for medium-skilled and -9.6% for the high-skilled. Using additional covariates that BFF use and we also observe makes hardly any difference.⁷

The next couple of rows in Table 2 depict the results of FE estimations with basic controls only, the specification similar to the one of BFF, and a specification similar to the one used by Kahn (2013). We also estimate the specification of BFF with a standard RE estimator. Whatever specification is used, the fixed-term contract wage effect for the low-skilled is always negligible, lying between -0.8% and +0.7%. Similarly, for the medium-skilled it amounts to only between -2.1% and -0.01%. For the high-skilled, though, we find a wage effect of -8.1% accounting only for basic controls and about -5% in the other specifications. In conclusion, controlling for observed characteristics and unobserved heterogeneity we find basically no wage effect of working under a fixed-term contract for the low- and medium-skilled but a considerable negative wage effect for the high-skilled. It is crucial to account for unobserved heterogeneity (and for the high-skilled also for experience) but then the selection of control variables does not matter.

Results of the Three-Equation Model

We now present the results on the wage effect of working under a fixed-term contract of our three-equation model. This specification departs from the specification similar to BFF and changes two important points: First, we add a flexibly specified work history to the RHS

⁷ BFF use a number of covariates which we don't have in our data, in particular firm size, disability status, marital status, on-the-job training, union coverage, performance related pay dummy, and detailed occupational information.

variables of our wage equation. This in particular accounts for the type of contract under which experience was collected and for previous quarters spent in unemployment. The coefficient of the FIX dummy thus now gives the effect of working under a fixed-term contract given the amount of experience under fixed-term contracts and given earlier unemployment. Second, we do not use a FE model but the three-equation RE for the reasons discussed above.⁸ Table A.1 displays means and standard deviations of the posterior distribution of the model parameters that can be interpreted as coefficients and standard errors from a Maximum Likelihood estimation. However, for ease of interpretation, we focus our discussion of the contract effects on selected (cumulative) effects of interest shown in Table 3. But note that parameter estimates in table A.1. also show (1) that one of the exclusions restrictions in the contract equations and the exclusions restriction of the employment equation are significant for all groups, while the second exclusion restriction of the contract equation is only significant for the low-skilled, (2) there is strong state dependence and duration dependence in the contract equation and in the employment equation, (3) a high share of the variance of the wage equation is on the individual level and the correlations between the random effects are relatively small but all significant.

The first row of Table 3 gives the wage effect of *working under a fixed-term contract in t as opposed to working under a permanent contract in t*. This has a negative wage effect of -2.5% for both the low-skilled and the high-skilled and no effect for the medium-skilled. Recall that an important difference between this specification and the ones in the previous section is that now we control for the type of contract under which experience was collected and for past unemployment. Thus, for the high-skilled (low-skilled) controlling for the work

⁸ We also estimate our benchmark wage equation using standard RE and FE methods (table A.2. depicts selected results). It turns out that the standard RE model, even though it relies on the assumption that employment and the type of contract in all quarters is independent of unobserved heterogeneity leads to similar results than the three-equation model. The FE model does not work very well identifying the parameters of the work history. The likely reason for this is that the FE model only uses switches for identification and as individual usually (if at all) switch contract status only once it is difficult to identify the coefficients relating to the history by this.

history leads to a less (more) negative effect which suggests that the work history of fixed-term workers involves negative (positive) returns or the work history of permanent contract workers (i.e. experience under fixed-term contracts of those who now work under a permanent contract) involves positive (negative) returns. Sensitivity analysis suggests that the latter is the more important reason: dropping the dummies capturing the number of past quarters under a fixed-term contract multiplied by the $PERM_{it}$ leads to results quite similar to those not accounting for the work history.

Rows 2 to 6 in Table 3 refer to the *cumulative effect of working under a fixed-term contract in t and before*. (The marginal effects for the returns to fixed-term contract work in the past can be seen in table A.1.) Row 2 in Table 3 depicts the cumulative effect of working under a fixed-term contract in t and having one quarter of experience under a fixed-term contract (in the time of our panel) versus working under a permanent contract in t and having no quarter of experience under a fixed-term contract (but the same amount of total experience as the fixed-term contract worker). This pattern has a very small negative wage effect (about -2%) for the low-skilled and high-skilled and a very small positive wage effect for the medium-skilled. Row 3 depicts the cumulative effect of working under a fixed-term contract in t and having four quarters of experience under a fixed-term contract versus working under a permanent contract in t (in the time of our panel) and having no quarter of experience under a fixed-term contract (but again the same amount of total experience as the fixed-term contract worker) for a worker with four quarter of tenure and one previous job. Note that the latter is relevant, because returns to tenure and to the number of previous jobs are allowed to be different by the contract status in t (see table A.1.). The wage effect of this career pattern is -1.7% for the low-skilled and zero for the medium-skilled and high-skilled. The following rows show the respective cumulative effects for eight, twelve, and 16 quarters. For the low-skilled the small negative effect stays basically constant becoming stronger when the elapsed time under a fixed-term contract is 16 quarters. For the medium-skilled the effect stays

basically zero or slightly positive. For the high-skilled working under a fixed-term contract for a long time becomes positive (2 to 3 %). This is in line with the results of Amuedo-Dorantes and Serrano-Padial (2007) who find that those fixed-term contract workers who manage to keep their job over time experience higher wage growth than fixed-term contract workers. In conclusion, we find only very small wage effects for working under a fixed-term contract also for a longer period of time. Fixed-term contract jobs are slightly disadvantageous to low-skilled workers with regard to pay. The contract does basically not matter for medium-skilled's wages and working under a fixed-term contract first has a slightly negative effect for the high-skilled which turns (on average) positive if they stay under a fixed-term contract for a long time.

The last three rows in Table 3 depict the *wage returns of having worked under a fixed-term contract in the past* for those who have switched to a permanent contract and thus work under a permanent contract in t . Having collected four quarter of experience under a fixed-term contract (as opposed to having collected all experience under a permanent contract) during the time our sample covers has a negative effect (-3.7%) for the low-skilled (row three from bottom). With more experience under a fixed-term contract the negative wage returns vanishes. For the medium-skilled the wage returns on experience under a fixed-term contract if working under a permanent contract in t are positive but quite small, while for the high-skilled the returns are positive and large. Two or three years of experience under a fixed-term contract involve a wage gain of 10% for those high-skilled who are permanent workers in t (always controlling for the total amount of experience). We investigate this result in more detail: First, as a robustness check, we have estimated the effects of fixed-term contract work in the past only using the sample of those working under a permanent contract in t using OLS and a standard RE model. We again find strong positive effects. We do not find these strong positive effects if we only use a sample of employees who are already under a permanent contract for a long time. Second, we descriptively investigate the wage profiles

of those high-skilled fixed-term workers who switch to permanent and find that they experience a very strong wage growth once they have switched to a permanent contract. Third, the large majority of switches from fixed to permanent work of the high-skilled occur within the same firm. These results are a strong indication that fixed-term contracts are used as a screening device and many of those very good matches who are selected to stay in the firm under a permanent contract climb up the wage ladder in the following years making a career. Those who start with a permanent contract from the beginning on face a smoother wage profile.

Summing up the results of Table 3, we find a small negative conditional wage effect of working under a fixed-term contract in t for the low-skilled and the high-skilled and no effect for the medium-skilled. These wage effects may consist of negative components (e.g. less highly productive (and consequently well paid) tasks performed by fixed-term contract workers) and a positive component (e.g. compensation for disadvantages coming along with a fixed-term contract). These components seem to play different roles by skill level and this is likely to be related to the type of fixed-term contract jobs which are more or less frequent depending of the skill level. Furthermore, we tend to find very small effects of experience under fixed-term contracts (as opposed to experience under permanent contracts). These tend to be rather negative for the low-skilled, potentially because the fixed-term contract jobs for low skilled are often casual jobs involving low potentials for collecting valuable experience. For the medium-skilled the returns are zero or small. The returns of experience under fixed-term contracts are positive for the high-skilled who stay under a fixed-term contract. Here high effort in an attempt to have the contract renewed may pay off. The returns are even higher for those high-skilled who have eventually managed to obtain a permanent contract and this may mirror successful careers in high ability jobs of those who prove to be very good matches during a screening period .

Results of the Simulations based on the Three-Equations Model

One important advantage of the joint estimation is that one can simulate careers under different scenarios. We simulate the career (i.e. employment status, contract status, wages and earnings over 18 quarters) of those men who are observed working under a fixed-term contract for at least four quarters at some point. We subsequently replicate the exercise, setting quarters 1 to 4 to working under a permanent contract for everyone. Finally, we take the difference in the outcome for every man (and every outcome) between the FIX case and the PERM case and average over all men. Conducting this for many MCMC iterations, we can analyze the impact of a career outcome (the treatment) on future career outcomes and wages and provide for example the “average treatment effect on the treated (ATT)” of working under a fixed-term contract as opposed to under a permanent contract for one year on a man’s future career. This simulation approach takes account of selection based on unobserved heterogeneity by exploiting the information on the random effects available from the MCMC estimation and for intermediate endogenous career decisions that may have been determined by the treatment. The simulation also takes into account state dependence and duration dependence (see Appendix for an explanation of the simulation procedure).⁹ Such a simulation cannot be achieved in the context of a standard FE or RE model, given that these models only focus on wages and neglect the endogenous determination of career choices. Prior to analyzing the treatment effects, we check the validity of the model specification by comparing the means of the career outcomes obtained from simulating the observed scenario (four quarters under a fixed-term contract) to those in the actual data in Tables A.3 to A.5. Overall, the simulated and actual means are similar, corroborating the validity of the model.

Tables 4 to 6 present the ATT of working under a fixed-term contract as opposed to working under a permanent contract for four quarters - for those men whom we observe (at any point of time in the data) to work under a fixed-term contract for at least four quarters in

⁹ The simulation approach builds on Fitzenberger et.al (2010) and is also used in Fernandez-Kranz et al. (2011).

row -. Table 4 relates to the sample of the low-skilled (Table 5 to the medium-skilled and Table 6 to the high-skilled, respectively). According to Table 4 (5 and 6, respectively), if a low-skilled men started out working under a fixed-term contract instead of a permanent contract in quarters 1 to 4, in quarter 6 he has a 7.66 (8.02 and 5.59, respectively) percentage points higher probability of being unemployed and a 71.08 (71.95 and 70.42, respectively) percentage point higher probability of working under a fixed-term contract, conditional on being employed. Thus, working under a fixed-term contract strongly increases the risk of unemployment (note that the unemployment rate for these fixed-term contract workers is 10% (9% and 7%, respectively), so that an effect of e.g. 7.66 percentage points is huge) and entails strong state dependence. In addition, there is a wage effect of +5.01 (+1.97 and -0.28) log points. So in particular the low-skilled workers benefit from working under a fixed-term contract with regard to their hourly wages (conditional on being employed). Remember that the simulation results are average treatment effects *on the treated*, i.e. they represent the average effect if those who men who work under a fixed-term contract for at least four quarters in the data, worked under a permanent contract instead (for these four quarters). Fixed-term contract workers have on average different observed and unobserved characteristics than the average person in the data, thus the wage effect they experience may be different from that of an average person in the data. Our findings suggest that low-skilled and medium-skilled fixed-term contract workers (i.e. men with the observed and unobserved characteristics of fixed-term contract workers) earn higher wages under fixed-term contracts than under permanent contracts. The reason could be that these men do benefit from a compensation component in their wage, but would not be able to make use of the chances permanent contracts offer (like being rewarded for performing particularly high productivity tasks or making use of training). Until here we have always considered wage effects given that a man succeeds in being employed. But we have seen in the descriptive results, that fixed-term contract workers have a much higher risk to switch to unemployment than

permanent workers and this is confirmed by the simulation results. Thus, while it is interesting to investigate the wage effects conditional on having a job as we have done in the previous sections and as it is standard in the literature, this may mask an important disadvantage of fixed-term contract work: the risk to have no job in the next period and thus no earnings at all. Therefore, in this section, we investigate the earnings effect (i.e. log wages set to zero if not working and to log wage if working) of working under a fixed-term contract which consists of the direct wage effect of fixed-term contract work (including returns to experience) and the indirect effect through the larger probability of becoming unemployment in the next period. We obtain an earnings effect of -10.87 (-15.24 and -13.95, respectively) percentage points in quarter 6. Thus, while we find a considerable positive effect for having worked under a fixed-term contract for low-skilled fixed-term contract workers, incorporating the risk of unemployment in our analysis, the earnings effect is strongly negative.

In quarter 12, the unemployment probability is still 5.33 (6.00 and 4.52, respectively) percentage points higher under the treatment situation. The “treatment” still leads to an increased fixed-term contract probability of 22.91 (23.73 and 19.96, respectively) percentage points and a wage effect of 4.21 (2.46 and 2.90, respectively) log points. The earnings effect is still negative with -7.26 (-11.06 and -8.85, respectively) log points. Even in quarter 18 - thus 14 quarters after the end of the “treatment”- the “treatment” still negatively affects the unemployment probability and the earnings, but not the fixed-term contract probability and the wages.

VI Conclusion

Using data from social security records on Spanish males, we investigate the wage effects of working under a fixed-term contract and the returns to experience of employment under a fixed-term contract. In a first step we provide standard fixed-effects estimates of the wage effect of working under a fixed-term contract for low-skilled, medium-skilled, and

high-skilled men based on administrative data. Next, we include the individual's work history into the wage equation to obtain wage effects conditional on the work history and to study the returns to experience under fixed-term contracts. For this analysis we employ a three-equation random effects model estimated by Markov Chain Monte Carlo (MCMC) methods. Finally, we use the estimates of this model to simulate the long-term effects of working under a fixed-term contract for one year on the probability to be unemployed, on the contract status, and on wages in the following years.

The findings of this paper confirm a large raw wage differential between fixed-term contract work and employment under permanent contracts. The results of the FE approach suggest that controlling for observable characteristics and unobserved heterogeneity, there remains basically no wage effect of working under a fixed-term contract for the low-skilled and the medium-skilled but a considerable negative wage effect exists for the high-skilled. The wage returns of experience under a fixed-term contract are not so much different from the wage returns under permanent contracts for the low-skilled and the medium-skilled. Experience under fixed-term contract tends to be a little less rewarded than experience under permanent contracts for the low-skilled. But high-skilled workers strongly benefit from experience under fixed-term contracts in particular if they have switched to a permanent contract. Simulation results suggest that working under a fixed-term contract for one year as opposed to working under a permanent contract for this year leads to a much higher probability of fixed-term contract work and of unemployment in the following years. The effects on the hourly wages (conditional on working) tend to be small and positive with some exceptions, but there are large negative, long-lasting effects on earnings (i.e. the wage set to zero if not working). This reflects the fact that fixed-term contract workers face a much higher risk to switch to unemployment than permanent contract workers and thus suffer from a strong loss in income through this channel.

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Table 1
Descriptive Statistics, Pooled Sample
(Means with Standard Deviations in Parentheses)

	Low-skilled		Medium-skilled		High-skilled	
	Perm.	Fixed.	Perm.	Fixed.	Perm.	Fixed.
Panel A:						
Employment rate	0.93 (0.25)		0.93 (0.26)		0.90 (0.30)	
Fixed-term contract rate if employed	0.13 (0.33)		0.13 (0.33)		0.20 (0.40)	
Hourly wage	11.15 (4.29)	9.50 (14.85)	13.44 (5.24)	10.23 (12.94)	16.59 (5.85)	12.80 (11.58)
Log hourly wage	2.34 (0.39)	2.06 (0.48)	2.53 (0.39)	2.14 (0.50)	2.76 (0.35)	2.41 (0.49)
Panel B:						
Number of quarters under fixed-term contract since inflow into sample of analysis	0.34 (1.80)	5.52 (6.05)	0.51 (2.16)	5.83 (6.28)	1.03 (2.87)	5.79 (6.07)
Number of quarters in non-employment since inflow into sample of analysis	0.22 (1.48)	1.59 (3.59)	0.29 (1.67)	1.91 (4.03)	0.48 (2.13)	1.80 (3.79)
Panel C:						
Probability of employment under permanent-contract next quarter	0.991	0.052	0.993	0.066	0.989	0.060
Probability of employment under fixed-contract next quarter	0.003	0.855	0.003	0.843	0.003	0.862
Probability of non-employment next quarter	0.005	0.092	0.004	0.092	0.007	0.078

Table 2
Wage Effects of Working under a Fixed-term Contract using POLS and FE

	Low-skilled	Medium-skilled	High-skilled
Panel A: POLS, no covariates			
Fix in t	-0.280 (0.002) ***	-0.382 (0.003) ***	-0.349 (0.002) ***
Panel B: POLS, basic controls (age categories, child dummy, UR and GDP growth in province, region dummies, year dummies, quarter dummies)			
Fix in t	-0.140 (0.002) ***	-0.182 (0.003) ***	-0.174 (0.003) ***
Panel C: POLS, basic controls and experience and experience squared			
Fix in t	-0.018 (0.002) ***	-0.066 (0.003) ***	-0.096 (0.003) ***
Panel D: POLS, “specification similar to BFF” (basic controls, experience, experience squared, tenure, tenure squared, number of previous jobs, three sector dummies, civil servant dummy)			
Fix in t	-0.017 (0.002) ***	-0.066 (0.003) ***	-0.097 (0.003) ***
Panel E: FE basic controls			
Fix in t	-0.008 (0.002) ***	-0.021 (0.002) ***	-0.081 (0.002) ***
Panel F: FE “specification similar to BFF”			
Fix in t	0.006 (0.002) ***	0.001 (0.002)	-0.051 (0.002) ***

Panel G: FE “specification similar to Kahn 2013” (age, age squared, tenure, tenure squared, year and quarter dummies, UR in province)			
Fix in t	0.007 (0.002) ***	-0.002 (0.002)	-0.052 (0.002) ***
Panel H: RE “specification similar to BFF”			
Fix in t	0.006 (0.002) ***	-0.003 (0.002)	-0.055 (0.002) ***

Note: Coefficients and standard errors (in parentheses) . *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 3
Wage Effects and Returns to Working under a Fixed-term Contract

	Low-skilled	Medium-skilled	High-skilled
Fix in t	-0.025 (0.004) ***	0.008 (0.005)	-0.025 (0.007) ***
Fix in t and 1 quarter of experience in fix vs perm in t and no quarter of experience in fix	-0.019 (0.004)***	0.017 (0.006)***	-0.022 (0.007)***
Fix in t and 4 quarters of experience in fix vs perm in t and no quarter of experience in fix; tenure: 4 quarters, number of previous jobs: 1	-0.017 (0.003)***	0.004 (0.005)	-0.001 (0.006)
Fix in t and 8 quarters of experience in fix vs perm in t and no quarter of experience in fix; tenure: 4 quarters, number of previous jobs: 1	-0.016 (0.004)***	0.009 (0.005)	0.020 (0.006)***
Fix in t and 12 quarters of experience in fix vs perm in t and no quarter of experience in fix; tenure: 4 quarters, number of previous jobs: 1	-0.013 (0.004)***	0.015 (0.006)**	0.035 (0.007)***
Fix in t and 16 quarters of experience in fix vs perm in t and no quarter of experience in fix; tenure: 4 quarters, number of previous jobs: 1	-0.033 (0.005)***	0.007 (0.007)	0.023 (0.008)***
Perm in t and 4 quarters of experience in fix versus perm in t and no quarter of experience in fix	-0.037 (0.004) ***	0.027 (0.005) ***	0.035 (0.007) ***
Perm in t and 8 quarters of experience in fix versus perm in t and no quarter of experience in fix	0.012 (0.005) **	0.047 (0.006) ***	0.101 (0.007) ***
Perm in t and 12 quarter of experience in fix versus perm in t and no quarter of experience in fix	-0.006 (0.006)	0.027 (0.007) ***	0.104 (0.008) ***

Note: Means and standard deviations (in parentheses) . *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 4
Average Treatment Effect on the Treated of Working under a Fixed-term Contract
instead of under a Permanent Contract for Four Quarters
Low-skilled

Quarter	on Unemployment	on Fixed-term	On log wage	On log earnings
1	0.00 (0.00)	100.00 (0.00) ***	4.33 (0.43) ***	4.33 (0.43) ***
2	0.00 (0.00)	100.00 (0.00) ***	4.66 (0.42) ***	4.66 (0.42) ***
3	0.00 (0.00)	100.00 (0.00) ***	4.78 (0.43) ***	4.78 (0.43) ***
4	0.00 (0.00)	100.00 (0.00) ***	4.84 (0.42) ***	4.84 (0.42) ***
5	5.92 (0.43) ***	84.43 (0.83) ***	5.05 (0.63) ***	-7.15 (1.05) ***
6	7.66 (0.52) ***	71.08 (1.24) ***	5.01 (0.65) ***	-10.87 (1.18) ***
7	7.68 (0.54) ***	59.80 (1.46) ***	4.92 (0.64) ***	-11.10 (1.23) ***
8	7.02 (0.61) ***	50.06 (1.67) ***	4.73 (0.67) ***	-10.08 (1.36) ***
9	6.63 (0.57) ***	41.85 (1.79) ***	4.77 (0.69) ***	-9.29 (1.32) ***
10	6.25 (0.60) ***	34.63 (1.90) ***	4.58 (0.70) ***	-8.74 (1.35) ***
11	5.83 (0.60) ***	28.41 (1.97) ***	4.38 (0.73) ***	-8.09 (1.38) ***
12	5.33 (0.66) ***	22.91 (1.99) ***	4.21 (0.81) ***	-7.26 (1.52) ***
13	4.80 (0.61) ***	18.13 (2.00) ***	3.42 (0.73) ***	-6.92 (1.37) ***
14	4.39 (0.62) ***	14.02 (2.02) ***	3.23 (0.79) ***	-6.24 (1.43) ***
15	4.06 (0.63) ***	10.35 (2.08) ***	3.14 (0.77) ***	-5.68 (1.48) ***
16	3.69 (0.66) ***	7.10 (2.19) ***	3.09 (0.85) ***	-4.96 (1.57) ***
17	3.23 (0.69) ***	4.06 (2.21)*	1.73 (0.92)*	-5.25 (1.66) ***
18	2.93 (0.70) ***	1.24 (2.21)	1.31 (0.98)	-5.00 (1.73) ***

Note:. Quarter 1 is the first quarter in which the man is observed working under a fixed-term contract in the data. Coefficients and standard errors (in brackets) are multiplied by 100. ***, **, * indicate significance at the 1%, 5%, 10% level. The effects may be interpreted as percentage points or log points, respectively. FIX and Log Wage are conditional on being employed, i.e. conditional on NE being zero. Earnings are set to the wage if working and to zero if not working.

Table 5
Average Treatment Effect on the Treated of Working under a Fixed-term Contract
instead of under a Permanent Contract for Four Quarters
Medium-skilled

Quarter	on Unemployment	on Fixed-term	On log wage	On log earnings
1	0.00 (0.00)	100.00 (0.00) ***	0.30 (0.59)	0.30 (0.59)
2	0.00 (0.00)	100.00 (0.00) ***	0.73 (0.57)	0.73 (0.57)
3	0.00 (0.00)	100.00 (0.00) ***	0.76 (0.60)	0.76 (0.60)
4	0.00 (0.00)	100.00 (0.00) ***	0.67 (0.60)	0.67 (0.60)
5	6.07 (0.54) ***	85.02 (1.02) ***	1.46 (0.84)*	-11.44 (1.38) ***
6	8.02 (0.65) ***	71.95 (1.47) ***	1.97 (0.95)**	-15.24 (1.59) ***
7	8.19 (0.65) ***	60.72 (1.77) ***	2.07 (0.93) **	-15.63 (1.61) ***
8	7.62 (0.68) ***	51.02 (2.02) ***	2.20 (0.93) **	-14.51 (1.73) ***

9	7.17 (0.72) ***	42.68 (2.12) ***	2.47 (0.94) ***	-13.33 (1.77) ***
10	6.82 (0.74) ***	35.47 (2.13) ***	2.53 (0.93) ***	-12.62 (1.82) ***
11	6.38 (0.75) ***	29.26 (2.17) ***	2.51 (0.98) ***	-11.76 (1.86) ***
12	6.00 (0.71) ***	23.73 (2.22) ***	2.46 (0.92) ***	-11.06 (1.72) ***
13	5.37 (0.73) ***	18.93 (2.20) ***	2.06 (0.98) **	-10.06 (1.82) ***
14	4.93 (0.73) ***	14.65 (2.20) ***	1.87 (0.99)*	-9.31 (1.80) ***
15	4.47 (0.78) ***	10.96 (2.22) ***	1.68 (0.92)*	-8.49 (1.91) ***
16	4.04 (0.75) ***	7.66 (2.30) ***	1.50 (1.03)	-7.78 (1.86) ***
17	3.67 (0.76) ***	4.77 (2.31) **	0.56 (0.98)	-7.80 (1.78) ***
18	3.36 (0.78) ***	2.12 (2.31)	0.04 (0.96)	-7.63 (1.89) ***

Note:. Quarter 1 is the first quarter in which the man is observed working under a fixed-term contract in the data. Coefficients and standard errors (in brackets) are multiplied by 100. ***, **, * indicate significance at the 1%, 5%, 10% level. The effects may be interpreted as percentage points or log points, respectively. FIX and Log Wage are conditional on being employed, i.e. conditional on NE being zero. Earnings are set to the wage if working and to zero if not working.

Table 6
Average Treatment Effect on the Treated of Working under a Fixed-term Contract
instead of under a Permanent Contract for Four Quarters
High-skilled

Quarter	on Unemployment	on Fixed-term	On log wage	On log earnings
1	0.00 (0.00)	100.00 (0.00) ***	-7.07 (0.85) ***	-7.07 (0.85) ***
2	0.00 (0.00)	100.00 (0.00) ***	-5.33 (0.83) ***	-5.33 (0.83) ***
3	0.00 (0.00)	100.00 (0.00) ***	-4.82 (0.83) ***	-4.82 (0.83) ***
4	0.00 (0.00)	100.00 (0.00) ***	-4.64 (0.82) ***	-4.64 (0.82) ***
5	4.35 (0.45) ***	84.24 (0.94) ***	-1.67 (0.89)*	-12.15 (1.30) ***
6	5.59 (0.51) ***	70.42 (1.34) ***	-0.28 (0.94)	-13.95 (1.45) ***
7	5.57 (0.54) ***	58.49 (1.60) ***	0.51 (0.98)	-13.21 (1.56) ***
8	5.10 (0.57) ***	48.15 (1.82) ***	1.10 (0.88)	-11.65 (1.62) ***
9	4.97 (0.56) ***	39.32 (1.89) ***	2.20 (0.85) ***	-10.41 (1.59) ***
10	4.86 (0.58) ***	31.90 (2.04) ***	2.55 (0.90) ***	-9.91 (1.62) ***
11	4.68 (0.57) ***	25.47 (2.10) ***	2.81 (0.90) ***	-9.28 (1.53) ***
12	4.52 (0.58) ***	19.96 (2.04) ***	2.90 (0.88) ***	-8.85 (1.61) ***
13	4.31 (0.61) ***	15.30 (2.06) ***	2.23 (0.92) **	-8.97 (1.70) ***
14	4.15 (0.64) ***	11.24 (2.04) ***	1.97 (0.97)**	-8.85 (1.78) ***
15	3.89 (0.62) ***	7.76 (2.06) ***	1.74 (0.86)**	-8.42 (1.75) ***
16	3.70 (0.65) ***	4.68 (2.02) **	1.49 (0.84) *	-8.24 (1.81) ***
17	3.49 (0.62) ***	2.15 (1.97)	0.52 (0.90)	-8.64 (1.77) ***
18	3.38 (0.70) ***	-0.06 (1.93)	0.41 (0.99)	-8.48 (1.97) ***

Note:. Quarter 1 is the first quarter in which the man is observed working under a fixed-term contract in the data. Coefficients and standard errors (in brackets) are multiplied by 100. ***, **, * indicate significance at the 1%, 5%, 10% level. The effects may be interpreted as percentage points or log points, respectively. FIX and Log Wage are conditional on being employed, i.e. conditional on NE being zero. Earnings are set to the wage if working and to zero if not working.

APPENDIX

Table A.1
Three Equations Model (Means and Standard Deviations of Parameters)

	Low-skilled	Medium-skilled	High-skilled
	Wage Equation		
FIX	-0.025 (0.004) ***	0.008 (0.005)	-0.025 (0.007) ***
1 quarter of experience under FIX * FIX	0.006 (0.003) *	0.009 (0.004) **	0.003 (0.005)
2 to 4 quarters of experience under FIX * FIX	0.008 (0.003) ***	0.016 (0.004) ***	0.026 (0.004) ***
5 to 8 quarters of experience under FIX * FIX	0.010 (0.003) ***	0.020 (0.005) ***	0.047 (0.005) ***
9 to 12 quarters of experience under FIX * FIX	0.013 (0.004) ***	0.027 (0.006) ***	0.062 (0.006) ***
13 to 16 quarters of experience under FIX * FIX	-0.007 (0.005)	0.019 (0.007) ***	0.049 (0.008) ***
17 to 24 quarters of experience under FIX * FIX	-0.056 (0.005) ***	-0.007 (0.007)	0.007 (0.008)
1 quarter of experience under FIX * PERM	-0.086 (0.007) ***	0.006 (0.009)	0.069 (0.011) ***
2 to 4 quarters of experience under FIX * PERM	-0.037 (0.004) ***	0.027 (0.005) ***	0.035 (0.007) ***
5 to 8 quarters of experience under FIX * PERM	0.012 (0.005) **	0.047 (0.006) ***	0.101 (0.007) ***
9 to 12 quarters of experience under FIX * PERM	-0.006 (0.006)	0.027 (0.007) ***	0.104 (0.008) ***
13 to 16 quarters of experience under FIX * PERM	0.042 (0.009) ***	0.001 (0.009)	0.014 (0.010)
17 to 24 quarters of experience under FIX * PERM	-0.078 (0.008) ***	-0.134 (0.010) ***	0.021 (0.012) *
Number of quarters unemployed	-0.001 (0.000) ***	0.006 (0.001) ***	0 (0.001)
At least one quarter unemployed	-0.021 (0.003) ***	-0.053 (0.004) ***	-0.043 (0.004) ***
Sector: trade	-0.086 (0.003) ***	-0.105 (0.004) ***	-0.091 (0.005) ***
Sector : services	-0.038 (0.003) ***	-0.066 (0.004) ***	-0.059 (0.004) ***
Sector : construction	-0.016 (0.003) ***	-0.090 (0.006) ***	-0.040 (0.007) ***
Civil servant	0.148 (0.007) ***	0.099 (0.007) ***	0.117 (0.006) ***
Tenure (in quarters) * FIX	0.001 (0.000) **	0.003 (0.000) ***	0.004 (0.000) ***
Tenure (in quarters) * PERM	0.002 (0.000) ***	0.003 (0.000) ***	0.003 (0.000) ***
Tenure squared (in quarters) * FIX	0 (0.000) ***	0 (0.000) ***	-0 (0.000)
Tenure squared (in quarters) * PERM	-0 (0.000) ***	-0 (0.000) ***	-0 (0.000) ***
Number of previous jobs * FIX	0.014 (0.001) ***	0.017 (0.002) ***	0.031 (0.002) ***
Number of previous jobs * PERM	0.013 (0.002) ***	0.038 (0.002) ***	0.037 (0.002) ***
t = 2	0.002 (0.002)	0.008 (0.003) **	0.011 (0.004) ***
t = 3	0.002 (0.002)	0.017 (0.003) ***	0.021 (0.004) ***
t = 4	0.027 (0.002) ***	0.034 (0.003) ***	0.039 (0.004) ***
t = 5	0.031 (0.002) ***	0.038 (0.003) ***	0.049 (0.004) ***
t = 6	0.030 (0.002) ***	0.046 (0.003) ***	0.057 (0.004) ***
t = 7	0.026 (0.003) ***	0.048 (0.003) ***	0.063 (0.004) ***
t = 8	0.041 (0.003) ***	0.071 (0.004) ***	0.086 (0.005) ***
t = 9	0.045 (0.003) ***	0.076 (0.004) ***	0.099 (0.005) ***
t = 10	0.043 (0.003) ***	0.081 (0.004) ***	0.102 (0.005) ***
t = 11	0.045 (0.004) ***	0.088 (0.005) ***	0.111 (0.006) ***
t = 12	0.049 (0.004) ***	0.087 (0.005) ***	0.108 (0.006) ***
t = 13	0.053 (0.004) ***	0.094 (0.005) ***	0.113 (0.006) ***
t = 14	0.051 (0.004) ***	0.098 (0.005) ***	0.122 (0.007) ***
t = 15	0.048 (0.004) ***	0.101 (0.006) ***	0.122 (0.007) ***
t = 16	0.063 (0.005) ***	0.112 (0.006) ***	0.127 (0.007) ***
t = 17	0.067 (0.005) ***	0.118 (0.006) ***	0.133 (0.007) ***
t = 18	0.066 (0.005) ***	0.122 (0.007) ***	0.145 (0.008) ***
t = 19	0.064 (0.005) ***	0.128 (0.007) ***	0.148 (0.008) ***
t = 20	0.069 (0.006) ***	0.113 (0.007) ***	0.126 (0.009) ***
t = 21	0.072 (0.006) ***	0.119 (0.008) ***	0.131 (0.009) ***
t = 22	0.070 (0.006) ***	0.125 (0.008) ***	0.134 (0.009) ***
t = 23	0.067 (0.006) ***	0.129 (0.008) ***	0.139 (0.010) ***
t = 24	0.056 (0.007) ***	0.108 (0.009) ***	0.120 (0.010) ***
t = 25	0.059 (0.007) ***	0.112 (0.009) ***	0.125 (0.011) ***
t = 26	0.081 (0.007) ***	0.140 (0.009) ***	0.146 (0.011) ***
t = 27	0.077 (0.007) ***	0.144 (0.010) ***	0.150 (0.011) ***
t = 28	0.061 (0.008) ***	0.121 (0.010) ***	0.137 (0.012) ***
t = 29	0.067 (0.008) ***	0.126 (0.010) ***	0.140 (0.012) ***
t = 30	0.065 (0.008) ***	0.132 (0.011) ***	0.147 (0.013) ***
t = 31	0.060 (0.008) ***	0.133 (0.011) ***	0.148 (0.013) ***

t = 32	0.068 (0.008) ***	0.127 (0.011) ***	0.131 (0.013) ***
t = 33	0.070 (0.009) ***	0.131 (0.012) ***	0.137 (0.014) ***
t = 34	0.068 (0.009) ***	0.137 (0.012) ***	0.142 (0.014) ***
t = 35	0.063 (0.009) ***	0.139 (0.012) ***	0.142 (0.014) ***
Experience in t = 1 (in quarters)	0.007 (0.000) ***	0.008 (0.000) ***	0.006 (0.000) ***
Share of experience in FIX in t=1	-0.021 (0.010) **	-0.080 (0.012) ***	-0.058 (0.013) ***
Age from 23 to 29	-0.038 (0.002) ***	-0.042 (0.003) ***	-0.076 (0.004) ***
Age from 30 to 34	-0.007 (0.001) ***	-0.005 (0.002) ***	-0.002 (0.003)
Age from 40 to 35	0 (0.001)	-0.010 (0.002) ***	-0.024 (0.003) ***
Age from 46 to 50	-0.003 (0.002)	-0.026 (0.003) ***	-0.051 (0.004) ***
Child younger six	0.002 (0.001)	0.002 (0.002)	0.006 (0.003) **
1998	0.021 (0.002) ***	-0.001 (0.003)	-0.029 (0.004) ***
1999	0.050 (0.003) ***	0.018 (0.004) ***	-0.022 (0.005) ***
2000	0.057 (0.004) ***	0.023 (0.005) ***	-0.018 (0.006) ***
2001	0.078 (0.005) ***	0.051 (0.007) ***	0.006 (0.008)
2002	0.093 (0.006) ***	0.067 (0.008) ***	0.014 (0.009)
2003	0.121 (0.007) ***	0.085 (0.009) ***	0.019 (0.011) *
2004	0.131 (0.008) ***	0.095 (0.011) ***	0.027 (0.012) **
January to March	0.002 (0.002)	0.010 (0.002) ***	0.014 (0.002) ***
April to June	-0.002 (0.002)	0.005 (0.002) ***	0.008 (0.002) ***
October to December	0.006 (0.002) ***	-0.001 (0.002)	-0.002 (0.002)
UR in province (deviation)	-0 (0.000) **	-0.001 (0.000) ***	-0.001 (0.000) ***
GDP growth in province (deviation)	0.008 (0.016)	-0.008 (0.024)	0.040 (0.034)
Region 1	0.086 (0.012) ***	0.040 (0.014) ***	0.035 (0.015) **
Region 2	-0.123 (0.014) ***	-0.159 (0.023) ***	-0.113 (0.022) ***
Region 3	-0.107 (0.010) ***	-0.108 (0.013) ***	-0.110 (0.015) ***
Region 4	-0.094 (0.010) ***	-0.131 (0.011) ***	-0.108 (0.014) ***
Region 5	-0.108 (0.011) ***	-0.120 (0.015) ***	-0.103 (0.018) ***
Region 6	-0.171 (0.017) ***	-0.161 (0.027) ***	-0.148 (0.027) ***
Region 7	-0.059 (0.020) ***	-0.074 (0.028) ***	-0.048 (0.033)
Region 9	-0.164 (0.011) ***	-0.179 (0.014) ***	-0.144 (0.018) ***
Region 10	-0.087 (0.030) ***	-0.133 (0.042) ***	-0.083 (0.049) *
Region 11	-0.048 (0.010) ***	-0.064 (0.011) ***	-0.012 (0.012)
Region 12	-0.127 (0.015) ***	-0.144 (0.021) ***	-0.221 (0.025) ***
Region 13	0.022 (0.023)	-0.015 (0.032)	-0.008 (0.033)
Region 14	-0.077 (0.018) ***	-0.098 (0.021) ***	-0.125 (0.023) ***
Region 15	-0.184 (0.013) ***	-0.175 (0.018) ***	-0.095 (0.024) ***
Region 16	-0.061 (0.021) ***	-0.091 (0.027) ***	-0.007 (0.033)
Region 17	-0.037 (0.018) **	-0.111 (0.023) ***	-0.096 (0.022) ***
Constant	2.020 (0.010) ***	2.152 (0.012) ***	2.457 (0.014) ***
Fixed-term Contract Equation			
FIX in t - 1	3.808 (0.029) ***	3.733 (0.036) ***	3.755 (0.034) ***
FIX in t -4	-0.137 (0.027) ***	-0.123 (0.031) ***	-0.200 (0.029) ***
Number of quarters in FIX	-0.045 (0.003) ***	-0.041 (0.004) ***	-0.040 (0.005) ***
Unemployed in t - 1	3.342 (0.041) ***	3.349 (0.051) ***	2.956 (0.048) ***
Unemployed in t - 4	0.105 (0.038) ***	0.026 (0.042)	0.007 (0.041)
Number of quarters unemployed	0.027 (0.004) ***	0.026 (0.004) ***	0.046 (0.005) ***
t	-0.016 (0.002) ***	-0.019 (0.002) ***	-0.033 (0.003) ***
t > 0	-0.310 (0.034) ***	-0.372 (0.044) ***	-0.326 (0.044) ***
FIX in t = 0	0.257 (0.034) ***	0.085 (0.038) **	0.040 (0.037)
Experience in t = 1 (in quarters)	-0.011 (0.001) ***	-0.012 (0.001) ***	-0.011 (0.002) ***
Share of experience in FIX in t=1	1.153 (0.044) ***	1.430 (0.059) ***	1.513 (0.062) ***
Tenure (in quarters) in t -1	0.027 (0.007) ***	-0.014 (0.010)	-0.050 (0.010) ***
Tenure squared (in quarters) in t -1	-0.001 (0.000) *	0.001 (0.000) ***	0.003 (0.001) ***
Number of previous jobs	0.352 (0.014) ***	0.170 (0.016) ***	0.018 (0.014)
Age from 23 to 29	-0.063 (0.033) *	-0.061 (0.041)	-0.055 (0.046)
Age from 30 to 34	-0.056 (0.032) *	-0.059 (0.041)	-0.106 (0.043) **
Age from 40 to 35	0.020 (0.031)	0.027 (0.047)	0.125 (0.053) **
Age from 46 to 50	-0.018 (0.038)	0.071 (0.059)	0.123 (0.066) *
Child younger six	0.021 (0.032)	0.076 (0.043) *	0.054 (0.048)
1998	0.080 (0.048) *	0.093 (0.053) *	0.117 (0.055) **
1999	0.139 (0.045) ***	0.116 (0.057) **	0.107 (0.056) *

2000	0.457 (0.045) ***	0.210 (0.054) ***	0.141 (0.054) ***
2001	0.468 (0.046) ***	0.335 (0.053) ***	0.250 (0.055) ***
2002	0.557 (0.046) ***	0.370 (0.054) ***	0.465 (0.057) ***
2003	0.666 (0.048) ***	0.412 (0.055) ***	0.648 (0.060) ***
2004	0.672 (0.049) ***	0.576 (0.057) ***	0.804 (0.063) ***
January to March	-0.183 (0.023) ***	-0.164 (0.028) ***	-0.191 (0.027) ***
April to June	-0.138 (0.023) ***	-0.102 (0.027) ***	-0.041 (0.026)
October to December	-0.043 (0.021) **	0.001 (0.027)	0.057 (0.026) **
UR in province (deviation)	0 (0.003)	0.004 (0.004)	-0.002 (0.004)
GDP growth in province (deviation)	-0.089 (0.510)	1.030 (0.660)	0.721 (0.643)
Region 1	0.088 (0.055)	0.171 (0.058) ***	0.073 (0.058)
Region 2	0.132 (0.057) **	0.010 (0.092)	0.119 (0.082)
Region 3	0.099 (0.045) **	0.086 (0.054)	0.160 (0.054) ***
Region 4	0.218 (0.050) ***	0.080 (0.062)	0.227 (0.065) ***
Region 5	0.111 (0.052) **	0.185 (0.057) ***	0.198 (0.061) ***
Region 6	0.204 (0.077) ***	0.227 (0.103) **	0.285 (0.109) ***
Region 7	0.108 (0.078)	0.167 (0.105)	0.053 (0.127)
Region 9	0.111 (0.047) **	0.107 (0.058) *	0.286 (0.068) ***
Region 10	0.298 (0.123) **	0.242 (0.155)	-0.001 (0.175)
Region 11	0.033 (0.046)	0.064 (0.046)	-0.017 (0.046)
Region 12	0.084 (0.068)	0.098 (0.076)	0.138 (0.086)
Region 13	0.026 (0.100)	0.127 (0.140)	0.060 (0.120)
Region 14	0.047 (0.068)	0.134 (0.073) *	0.142 (0.074) *
Region 15	-0.018 (0.051)	0.012 (0.068)	0.151 (0.085) *
Region 16	0.132 (0.088)	0.213 (0.106) **	0.090 (0.113)
Region 17	0.105 (0.072)	0.054 (0.090)	0.046 (0.083)
Subsidy in Thousand Eurors * (FIX in t - 1)	-0.015 (0.005) ***	-0.014 (0.005) ***	-0.009 (0.004) **
Subsidy in Th. Euros * (Unemployed in t - 1)	-0.029 (0.008) ***	-0.002 (0.009)	0.006 (0.008)
Constant	-2.923 (0.072) ***	-2.651 (0.080) ***	-2.469 (0.088) ***
Employment Equation			
Unemployed in t - 1	-2.364 (0.024) ***	-2.509 (0.030) ***	-2.402 (0.029) ***
Unemployed in t - 4	-0.287 (0.019) ***	-0.187 (0.025) ***	-0.163 (0.024) ***
Number of quarters unemployed	0.032 (0.003) ***	0.040 (0.003) ***	0.033 (0.003) ***
FIX in t- 1	-0.845 (0.023) ***	-0.947 (0.028) ***	-0.812 (0.028) ***
FIX in t - 1	0.109 (0.019) ***	0.159 (0.025) ***	0.225 (0.023) ***
Number of quarters in FIX	-0.024 (0.003) ***	-0.032 (0.004) ***	-0.038 (0.004) ***
t	-0.003 (0.001) **	-0.006 (0.002) ***	-0.004 (0.002) *
t > 0	-0.050 (0.024) **	-0.035 (0.031)	-0.052 (0.031) *
Employed in t = 0	0.336 (0.029) ***	0.368 (0.035) ***	0.360 (0.037) ***
Experience in t = 1 (in quarters)	0.011 (0.001) ***	0.014 (0.001) ***	0.010 (0.001) ***
Share of experience in FIX in t=1	0.590 (0.030) ***	0.724 (0.044) ***	0.725 (0.043) ***
Tenure (in quarters) in t -1	0.155 (0.005) ***	0.168 (0.007) ***	0.149 (0.008) ***
Tenure squared (in quarters) in t -1	-0.006 (0.000) ***	-0.007 (0.000) ***	-0.006 (0.000) ***
Number of previous jobs	-0.025 (0.009) ***	-0.005 (0.012)	-0.022 (0.012) *
Age from 23 to 29	-0.015 (0.023)	-0.086 (0.035) **	-0.057 (0.039)
Age from 30 to 34	0.018 (0.024)	-0.008 (0.032)	0.007 (0.035)
Age from 34 to 35	-0.007 (0.023)	-0.010 (0.036)	-0.023 (0.042)
Age from 46 to 50	0.031 (0.026)	-0.040 (0.046)	-0.041 (0.049)
Child younger six	0.055 (0.025) **	0.063 (0.038) *	0.065 (0.040)
1998	-0.042 (0.031)	-0.127 (0.040) ***	-0.100 (0.037) ***
1999	-0.068 (0.031) **	-0.067 (0.040) *	-0.012 (0.038)
2000	-0.011 (0.031)	-0.020 (0.040)	0.108 (0.038) ***
2001	-0.036 (0.030)	-0.014 (0.041)	0.117 (0.039) ***
2002	0.013 (0.031)	0.070 (0.042) *	0.187 (0.041) ***
2003	0.148 (0.032) ***	0.214 (0.045) ***	0.397 (0.043) ***
2004	0.285 (0.034) ***	0.376 (0.047) ***	0.602 (0.046) ***
January to March	-0.052 (0.016) ***	-0.052 (0.020) **	0 (0.019)
April to June	0.030 (0.015) **	0.073 (0.021) ***	0.071 (0.020) ***
October to December	-0.058 (0.015) ***	0.004 (0.020)	0.081 (0.019) ***
UR in province (deviation)	-0.006 (0.002) ***	-0.006 (0.003) *	-0.007 (0.003) *
GDP growth in province (deviation)	0.208 (0.345)	0.991 (0.480) **	1.155 (0.487) **
Region 1	-0.034 (0.038)	0.008 (0.046)	0.062 (0.049)

Region 2	-0.039 (0.046)	-0.143 (0.074) *	-0.491 (0.073) ***
Region 3	-0.061 (0.033) *	-0.029 (0.045)	-0.269 (0.045) ***
Region 4	-0.050 (0.037)	-0.075 (0.050)	-0.223 (0.053) ***
Region 5	-0.043 (0.040)	-0.017 (0.050)	-0.212 (0.052) ***
Region 6	-0.110 (0.057) *	-0.119 (0.089)	-0.279 (0.088) ***
Region 7	-0.061 (0.058)	-0.286 (0.083) ***	-0.258 (0.109) **
Region 9	-0.049 (0.036)	0.031 (0.048)	-0.030 (0.055)
Region 10	-0.026 (0.107)	0.123 (0.155)	-0.136 (0.149)
Region 11	-0.090 (0.031) ***	-0.068 (0.036) *	0.196 (0.038) ***
Region 12	-0.004 (0.050)	-0.079 (0.069)	-0.331 (0.074) ***
Region 13	0.085 (0.087)	0.029 (0.112)	-0.085 (0.103)
Region 14	-0.096 (0.048) **	-0.030 (0.064)	0.040 (0.064)
Region 15	-0.139 (0.038) ***	-0.122 (0.056) **	-0.173 (0.073) **
Region 16	-0.071 (0.064)	0.086 (0.098)	0.156 (0.097)
Region 17	0.046 (0.059)	-0.081 (0.074)	-0.262 (0.068) ***
public sector emp. in year, region, occup. cell	0.011 (0.001) ***	0.019 (0.001) ***	0.036 (0.001) ***
Constant	1.498 (0.049) ***	1.417 (0.069) ***	0.956 (0.072) ***
Variance and Covariance Parameters			
$\text{Var}(\alpha^W) / (\text{Var}(\alpha^W) + \text{Var}(\varepsilon^W))$	0.816 (0.002) ***	0.796 (0.002) ***	0.726 (0.003) ***
$\text{Var}(\alpha^F) / (\text{Var}(\alpha^F) + 1)$	0.255 (0.013) ***	0.224 (0.015) ***	0.233 (0.016) ***
$\text{Var}(\alpha^E) / (\text{Var}(\alpha^E) + 1)$	0.190 (0.011) ***	0.232 (0.013) ***	0.252 (0.012) ***
$\text{Corr}(\alpha^W, \alpha^F)$	-0.037 (0.017) **	-0.094 (0.024) ***	-0.069 (0.022) ***
$\text{Corr}(\alpha^F, \alpha^E)$	0.266 (0.038) ***	0.194 (0.048) ***	0.180 (0.046) ***
$\text{Corr}(\alpha^W, \alpha^E)$	0.143 (0.015) ***	0.223 (0.019) ***	0.192 (0.017) ***

Notes: Means and standard deviations (in brackets). ***, **, * indicate significance at the 1%, 5%, 10% level. FIX is a dummy for employment under a fixed-term contract and perm is a dummy for employment under a permanent contract. The omitted category for the service dummies is manufacturing and others.

Table A.2.
Sensitivity Analysis: Wage Effects and Returns to Working under a Fixed-term contract: Selected Results of Alternative Methods

	Low-skilled	Medium-skilled	High-skilled
Panel A: Wage Equation of Benchmark Model estimated by standard RE			
Fix in t	-0.026 (0.004) ***	0.003 (0.005)	-0.030 (0.007) ***
Fix in t and 4 quarters of experience in fix vs perm in t and no quarter of experience in fix; tenure: 4 quarters, number of previous jobs: 1	-0.018 (0.003) ***	0.002 (0.005)	-0.004 (0.006)
Perm in t and 4 quarters of experience in fix versus perm in t and no quarter of experience in fix	-0.037 (0.004) ***	0.026 (0.005) ***	0.028 (0.005) ***
Panel B: Wage Equation of Benchmark Model estimated by standard FE			
Fix in t	-0.016 (0.003) ***	0.041 (0.006) ***	-0.029 (0.007) ***
Fix in t and 4 quarters of experience in fix vs perm in t and no quarter of experience in fix; tenure: 4 quarters, number of previous jobs: 1	-0.038 (0.004) ***	0.018 (0.005)	0.024 (0.006)
Perm in t and 4 quarters of experience in fix versus perm in t and no quarter of experience in fix	-0.038 (0.004) ***	0.038 (0.006)	0.048 (0.007)

Note: Coefficients and standard errors (in parentheses) . *** significant at 1%, ** significant at 5%, * significant at 10%.

Table A.3
Observed Outcomes and Simulated Outcomes: Low-skilled

Quarter	% UE observed	% UE predicted	% FIX observed	% FIX predicted	Log wage	Log wage	Earnings observed	Earnings predicted
1	0.00	0.00	100.00	100.00	1.99	1.99	1.99	1.99
2	0.00	0.00	100.00	100.00	2.00	2.00	2.00	2.00
3	0.00	0.00	100.00	100.00	2.01	2.01	2.01	2.01
4	0.00	0.00	100.00	100.00	2.03	2.03	2.03	2.03
5	7.04	7.32	88.06	92.64	2.04	2.05	1.90	1.90
6	10.13	10.34	83.58	86.67	2.05	2.06	1.84	1.84
7	11.42	11.43	80.10	81.30	2.06	2.06	1.83	1.83
8	11.01	11.63	76.12	76.30	2.08	2.08	1.85	1.84
9	11.00	11.76	73.49	72.79	2.08	2.08	1.85	1.84
10	11.31	11.84	71.23	70.01	2.09	2.09	1.85	1.84
11	11.59	11.78	68.06	67.39	2.11	2.10	1.86	1.85
12	10.62	11.39	64.16	64.05	2.12	2.10	1.89	1.86
13	10.84	10.99	61.06	61.69	2.12	2.11	1.89	1.88
14	10.61	10.60	60.02	59.39	2.12	2.11	1.90	1.89
15	11.54	10.51	58.38	57.11	2.14	2.12	1.89	1.90
16	10.48	10.14	56.52	54.70	2.14	2.13	1.92	1.91
17	9.61	9.49	54.82	52.96	2.14	2.13	1.94	1.92
18	10.92	9.12	54.95	51.70	2.15	2.13	1.91	1.93

Note:. Quarter 1 is the first quarter in which the man is observed working under a fixed-term contract in the data. FIX and Log Wage are conditional on being employed, i.e. conditional on UE (unemployment) being zero. Earnings are set to the wage if working and to zero if not working.

Table A.4
Observed Outcomes and Simulated Outcomes: Medium-skilled

Quarter	% UE observed	% UE predicted	% FIX observed	% FIX predicted	Log wage	Log wage	Earnings observed	Earnings predicted
1	0.00	0.00	100.00	100.00	2.04	2.04	2.04	2.04
2	0.00	0.00	100.00	100.00	2.06	2.07	2.06	2.07
3	0.00	0.00	100.00	100.00	2.08	2.08	2.08	2.08
4	0.00	0.00	100.00	100.00	2.10	2.11	2.10	2.11
5	7.72	7.21	87.33	91.17	2.13	2.12	1.96	1.97
6	9.06	10.23	81.83	83.75	2.14	2.14	1.95	1.92
7	11.05	11.28	77.11	77.53	2.16	2.15	1.92	1.91
8	11.35	11.49	70.78	72.02	2.18	2.18	1.94	1.93
9	11.79	11.51	65.82	67.86	2.20	2.19	1.94	1.94
10	11.75	11.62	63.88	64.41	2.21	2.20	1.95	1.95
11	12.13	11.47	60.61	61.52	2.24	2.22	1.97	1.96

12	12.67	11.36	56.03	58.41	2.23	2.23	1.95	1.98
13	11.32	10.80	54.03	55.59	2.24	2.24	1.99	2.00
14	10.38	10.48	53.28	53.13	2.24	2.25	2.01	2.01
15	9.99	10.03	49.95	50.67	2.26	2.25	2.03	2.03
16	10.51	9.71	48.00	47.85	2.27	2.27	2.03	2.05
17	9.36	9.27	47.38	46.20	2.28	2.27	2.07	2.06
18	9.41	9.01	47.29	44.51	2.29	2.28	2.07	2.07

Note:. Quarter 1 is the first quarter in which the man is observed working under a fixed-term contract in the data. FIX and Log Wage are conditional on being employed, i.e. conditional on UE(unemployment) being zero. Earnings are set to the wage if working and to zero if not working.

Table A.5
Observed Outcomes and Simulated Outcomes: High-skilled

Quarter	% NE observed	% NE predicted	% FIX observed	% FIX predicted	Log wage	Log wage	Earnings observed	Earnings predicted
1	0.00	0.00	100.00	100.00	2.28	2.29	2.28	2.29
2	0.00	0.00	100.00	100.00	2.30	2.32	2.30	2.32
3	0.00	0.00	100.00	100.00	2.33	2.35	2.33	2.35
4	0.00	0.00	100.00	100.00	2.37	2.37	2.37	2.37
5	4.82	5.68	91.80	91.58	2.40	2.42	2.29	2.28
6	6.82	8.00	86.51	83.81	2.45	2.44	2.28	2.25
7	7.86	8.83	80.96	77.16	2.46	2.46	2.27	2.24
8	9.43	9.08	65.53	71.08	2.50	2.49	2.27	2.27
9	9.23	9.40	59.82	66.27	2.53	2.52	2.29	2.28
10	9.34	9.66	55.98	62.22	2.54	2.54	2.30	2.29
11	9.61	9.66	51.26	58.79	2.56	2.55	2.31	2.31
12	8.80	9.69	47.43	55.53	2.57	2.57	2.34	2.32
13	8.49	9.55	45.77	52.23	2.58	2.57	2.36	2.33
14	8.93	9.52	43.55	48.49	2.59	2.58	2.36	2.34
15	7.16	9.16	41.48	45.55	2.59	2.59	2.41	2.35
16	7.75	8.99	39.30	42.21	2.62	2.61	2.41	2.38
17	8.85	8.71	37.07	39.73	2.64	2.61	2.40	2.38
18	8.65	8.72	35.43	36.55	2.65	2.63	2.42	2.40

Note:. Quarter 1 is the first quarter in which the man is observed working under a fixed-term contract in the data. FIX and Log Wage are conditional on being employed, i.e. conditional on UE (unemployment) being zero. Earnings are set to the wage if working and to zero if not working.

Simulation procedure

The following refers to the simulation procedure used to produce the results in table 4. We use those men in the sample that are observed for at least four quarters under a fixed-term contract. For $s = 1$ (first quarter under fixed-term contract) to $s = 4$ and MCMC iteration round 10001 (after burn-in phase) we set the employment dummy to one and the fix-term contract dummy to one (this is as observed in the data). Then we use the estimated coefficients of this iteration round and the predictors of the random effects of this iteration round together with idiosyncratic errors drawn from a standard normal to predict the log wage for all men. Next, we predict the employment status and the contract status for $s = 5$. We adapt the endogenous covariates according to this prediction and predict (again using all information from round 10001) the log wage for all men. Then we move to $s=6$ and predict - in the same way as before - the employment dummy, then the contract status and then the log wage, each time updating the covariates using the predictions we already have. We continue until $s = 16$. We take averages of predicted employment dummies, contract dummies and the log wage over all men. Afterwards we do the same again but setting the FIX dummy to permanent for $s=1$ to 4. Thus, here we simulate the counterfactual outcome. For each simulated outcome and each period, we take the difference between the treatment outcome and the counterfactual outcome and average over all men. This gives us one draw of the average treatment effect of working under a fixed-term contract in $s= 1$ to $s= 4$ as opposed to working under a permanent contract in these four quarters. We do all this with MCMC iteration round 10101, then with 10201 and so on until 50000. (Because this simulation is very time consuming, we use only every 100th iteration round). This gives us many draws of the ATT and we provide the mean and standard deviation in Table 4.